TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT

For FECAL COLIFORM in the

LITTLE RIVER WATERSHED

(HUC 03060105)

McDuffie, Wilkes, and Lincoln Counties, Georgia

EPA United States Environmental Protection Agency

Region 4 serving the southeast

APPROVAL PAGE

for FECAL COLIFORM in

Little River, GA

Georgia=s final 1998 303(d) list identified Little River near Augusta, GA as not supporting its designated use for fishing, with the pollutant of concern being fecal coliform. This total maximum daily load (TMDL) is being established pursuant to the 1998 Georgia 303(d) list and the Consent Decree in the Georgia TMDL Lawsuit.

The background concentration of fecal coliform in Little River is assumed to equal 20 counts/100ml. This concentration is based on the background levels in other streams in the basin.

The Total Maximum Daily Load for Little River for fecal coliform is given below:

Pollutant	**TMDL (counts/day)**	**WLA (counts/day)**	**LA (counts/day)**	**MOS**
Fecal Coliform	9.35×10^{10}	8.5×10^{10}	8.5×10^{9}	Implicit

The Fecal Coliform TMDL for Little River is 9.35×10^{10} counts/day.

APPROVED BY:

_____ _____

Robert F. McGhee, Director Date

Water Management Division

EPA-Region 4

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Introduction

Section 303(d) of the Clean Water Act (CWA) as Amended by the Water Quality Act of 1987, Public Law 100-4, and the United States Environmental Protection Agency's (USEPA/EPA) Water Quality Planning and Management Regulations [Title 40 of the Code of Federal Regulation (40 CFR), Part 130] require each State to identify those waters within its boundaries not meeting water quality standards applicable to the waters' designated uses. Total maximum daily loads (TMDLs) for all pollutants violating or causing violation of applicable water quality standards are established for each identified water. Such loads are established at levels necessary to implement the applicable water quality standards with consideration given to seasonal variations and margins of safety. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a water body, based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water-quality based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (USEPA, 1991a).

Problem Definition

Georgia's final 1998 Section 303(d) list identified 8 miles of Little River from the confluence with Rocky Creek to Clarks Hill Reservoir as not supporting its designated use for fishing, with the pollutant of concern being fecal coliform. This listing decision was based on limited data collected at water quality station 01008501.

The TMDL is established pursuant to EPA commitments in the October 1997 Consent Decree in the Georgia TMDL lawsuit (Sierra Club v. EPA & Hankinson, 1998). These conditions include a requirement that TMDLs be proposed by August 30, 1999, for each water on the 1998 303(d) list that is impacted by a National Pollutant Discharge Elimination System (NPDES) permitted point source or point sources, and is

located in the Savannah/Ogeechee Basins.

Target Identification

The target level for the development of the Fecal Coliform TMDL in Little River is the numeric criterion established in Georgia's Rules and Regulations for Water Quality Control, Chapter 391-3-6, Revised July 6, 1999. The regulation establishes the freshwater criteria for fecal coliform expressed in terms of a geometric mean concentration of no more than 200 counts/100 ml for the months of May through October and 1,000 counts/100 ml for the months of November through April.

Background

The segment that is impaired is 8 miles from the confluence with Rocky Creek to Clarks Hill Reservoir. This segment of Little River is on the State of Georgia's §303 (d) list for violating the total fecal coliform standard for the State of Georgia. The State of Georgia collects water quality data on Little River at U.S. Highway 78 near Washington, Georgia (please see Appendix A). A review of the data collected (from 1991-1997) at this station indicates four violations during the months May through October and eight violations during the months November through April.

There are no permitted dischargers on the listed segment of the Little River. The City of Washington operates a water pollution control plant (GA0031101) and discharges treated municipal wastewater to Rocky Creek, a tributary to Little River. The City of Washington facility is the only point source permitted to discharge fecal coliform in the watershed. An evaluation of the facility's discharge monitoring report (DMR) indicates that the plant has met end-of-pipe criteria for fecal coliform since 1994. Suspected sources of fecal coliform contamination may include non-point source pollution such as livestock access to streams, agricultural runoff, leaky septic tanks, leaky collection systems, sewer overflows, and wildlife.

Numeric Targets and Sources - Model Development

A steady-state water quality model provides predictions for only a single set of environmental conditions. For NPDES permitting purposes, steady-state models are applied for "critical" environmental conditions that represent conditions when the assimilative capacity of a waterbody is very low. For discharges to riverine systems, critical environmental conditions correspond to drought upstream flows. The assumption behind steady-state modeling is that permit limits that protect water quality during critical conditions will be protective for the large majority of environmental conditions that occur. This TMDL does not consider the impacts of non-point source loadings of fecal coliform due to wet weather events when the assimilative capacity of a waterbody is greater.

Critical Condition Determination

The most critical condition for Little River will be used to determine the TMDL. Fecal coliform will be considered a conservative substance in the TMDL calculation. The influence on the instream fecal coliform concentration will be river flow. For Little River, the critical flow will be considered 0.49 cubic meters per second. This flow represents the seven-day low flow that occurs once every ten years (7Q10) on record for Little River, which is required by Georgia State law for regulated waters. The 7Q10 low flow characteristics of Little River was obtained from BASINS, accessing the Reach File 1 meta information (USEPA, 1998).

Total Maximum Daily Load (TMDL)

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while achieving water quality standards. The components of the TMDL are the Wasteload Allocation (WLA) and the Load Allocation (LA) and taking into consideration a margin of safety and seasonality. The WLA is the pollutant allocation to point sources while the LA is the pollutant allocation to natural background and

nonpoint sources.

Margin of Safety

The margin of safety (MOS) is part of the TMDL development process. There are two basic methods for incorporating the MOS (USEPA, 1991a):

- Implicitly incorporating the MOS using conservative model assumptions to develop allocations, or
- Explicitly specifying a portion of the total TMDL as the MOS; using the remainder for allocations.

The MOS is incorporated implicitly into this modeling process by selecting the critical low flow based on 20 years of flow data.

TMDL Calculation

The TMDL calculation will utilize the conservation of mass principle, where the load can be calculated by using the following relationship:

Concentration = Load / Flow

Rearranging this equation the maximum load can be calculated as follows:

Load = Concentration (Water Quality Standard) * Flow

The background concentration of fecal coliform in Little River is assumed to equal 20 counts/100ml. This concentration is based on the background levels in other streams in the basin. The resulting load allocation for Little River is 8.5×10^9 counts/day.

The Total Maximum Daily Load for Little River for fecal coliform is given in Table 1**.**

Table 1. TMDL Calculation and Waste Load Allocation

Pollutant	TMDL (counts/day)	WLA (counts/day)	LA (counts/day)	MOS

Fecal Coliform	9.35×10^{10}	8.5×10^{10}	8.5×10^{9}	Implicit

The Fecal Coliform TMDL for Little River is 9.35×10^{10} counts/day.

Seasonal Variation

The low flow condition represents the most critical design condition and will provide year round protection. For example at the long term mean flow of 10 cms the maximum daily load of fecal coliform concentration would be 1.7×10^{12} counts/day. This concentration is about 95 % higher than the TMDL.

Allocation of Responsibility and Recommendations

The allocation for fecal coliform to Little River is given in Table 1. For a potential future point or nonpoint source of fecal coliform loading introduced into the system, the total of the WLA (wasteload allocations for point source loadings) and LA (load allocation for nonpoint source loadings) shall not exceed this TMDL.

References:

USEPA. 1991a. *Guidance for Water Quality–based Decisions: The TMDL Process.* U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-440/4-91-001, April 1991a.

USEPA. 1998. *Better Assessment Science Integrating Point and Nonpoint Sources, BASINS, Version 2.0 User's Manual.* U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-823-B-98-006, November 1998.

Georgia Department of Natural Resources, Environmental Protection Division. 1998. *Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards,* July 1999.

Sierra Club v. EPA & Hankinson. 1998. USDC-ND-GA Atlanta Div. #1: 94-CV-2501-MHS.

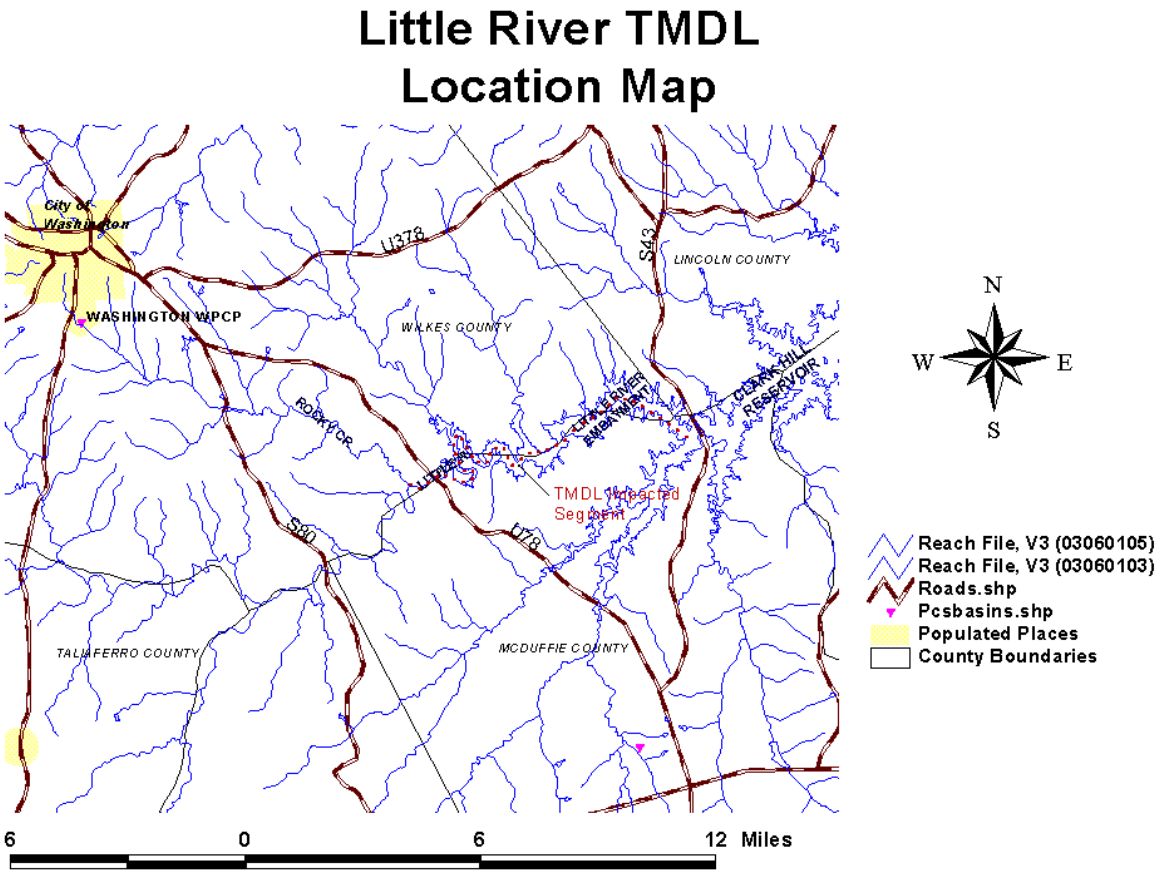
Appendix A: Water Quality Data at Station 01008501

01008501

STORET System
33 38 15.0 082 35 44.0 2
LITTLE RIVER - U.S. HIGHWAY 78 NEAR WASHINGTON
13317 GEORGIA WILKES
SOUTHEAST 031300
SAVANNAH
21GAEPD 03060105 /TYPA/AMBNT/STREAM
910803 DEPTH 0

DATE FROM TO	TIME OF DAY	DEPTH FEET	31615 FEC COLI MPNECMED /100ML
91/07/24	1000	0	330
91/10/16	1300	0	20
91/12/19	1030	0	515
92/04/22	0915	0	7900
92/06/16	1230	0	1300
92/08/19	0930	0	33500
92/10/22	1030	0	170
92/12/16	1030	0	490
93/02/18	1030	0	1100
93/04/21	0830	0	20
93/06/30	0900	0	170
93/08/18	0930	0	20K
97/02/03	0630	0	490
97/02/20	0530	0	490
97/03/20	0545	0	170
97/04/17	0500	0	20K
97/05/22	0530	0	50
97/06/19	0430	0	1100
97/07/24	0445	0	3300
97/08/21	0430	0	110
97/09/18	0430	0	20
97/10/16	0430	0	230
97/11/06	0530	0	310
97/12/04	0545	0	330

Appendix B: Location Map



Appendix C: Units Conversion Table

From	To	Multiply by:
Million Gallons per Day (MGD)	Cubic Meters per Second (cms)	0.04381
Cubic Feet per Second (cfs)	Cubic Meters per Second (cms)	0.02832
Pounds (lbs)	Kilograms (Kg)	0.4536
Tons (Short)	Kilograms (Kg)	907.1848
Tons (Long)	Kilograms (Kg)	1016.00

Administrative Record Index

1. City of Washington, Georgia, Water Pollution Control Plant NPDES Permit No. GA0031101.
2. Compilation of Georgia's Current Modeling Guidelines for the Development of Wasteload Allocations and NPDES Permit Limitations. January 1991
3. Georgia Department of Natural Resources, Environmental Protection Division, Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards
4. Shivalingaiah, B. and James, W. (June 1984) Algorithms for buildup washoff and routing pollutants in urban runoff., Proceedings of 3rd International Conference on Urban Storm Drainage, Goteborg Sweden, pp. 1445-1456., Reference No. I3147
5. STORET Water Quality Data
6. Stored on TMDL Shared drive m:/apps32/tmdl/little STORET Water Quality Data
7. Stored on TMDL Shared drive m:/apps32/tmdl/little Excel Spreadsheet to calculate fecal coliform concentration
8. Stored on TMDL Shared drive m:/apps32/tmdl/little TMDL Report
9. Stored on TMDL Shared drive m:\apps32\tmdl\little DMR for City of Washington WPCP

Response to Public Comment on Proposed TMDL

COMMENT

It is not clear if the City of Washington is to receive the wasteload allocation (WLA) or if its permit is consistent with the WLA. If not, the City of Washington=s permit needs to be reduced to match the WLA component of the proposed TMDL.

Mr. Eric E. Huber, EarthJustice Legal Defense Fund, 400 Magazine Street, Suite 401, New Orleans, Louisiana 70130-2453, December 7, 1999

RESPONSE

The City of Washington's permit reflects end of pipe criteria for fecal coliform bacteria. This load is within the WLA portion of the proposed TMDL. Therefore, it is not necessary to change the City of Washington's NPDES permit.

COMMENT

The TMDLs were calculated using mass balance techniques. Commenters do not believe that the mass balance technique addresses the complexity of the sampling and potential elevated background loading associated with fecal coliform.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

RESPONSE

Comment noted.

COMMENT

The more appropriate water quality standard appears to be 500 counts/100 ml and the load allocation should be correspondingly increased.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

RESPONSE

The water quality standard used in the calculation of the TMDL reflects the designated use of the stream as reported in GAEPD Rules and Regulations for Water Quality Control, Chapter 391-3-6, July 6, 1999. The designated use for Little River is fishing and the standard is the geometric mean of 200 counts/100ml. According to the above regulations, only when water quality and sanitary studies show fecal coliform levels from non-human sources exceed 200 counts/100 ml (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 500 counts/100 ml in free flowing freshwater streams. Studies of this type have not been done.

COMMENT

The low flow scenario is not the only water quality limited situation for this water. It is not legally or technically acceptable for a TMDL to fail to address all pertinent critical flow scenarios. Failure to address high flow scenarios at this time will allow the most serious fecal problems to go unaddressed for a long time.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Because of the use of critical low flow conditions, EPA feels this provides an adequate margin of safety without using an explicit method.

COMMENT

EPA needs to justify its intention to set a TMDL at low flow and to use that as a margin of safety. There must be some accounting of nonpoint loads of fecal. The evident desire of EPA to split fecal into two separate TMDLs in order to address high flow TMDL considerations at a later time is not an appropriate approach and it fails to adequately address the required seasonal variation component of a TMDL.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Because of the use of critical low flow conditions, EPA feels this provides an adequate margin of safety without using an explicit method.

COMMENT

Fecal problems occur mostly at higher flows from nonpoint sources, from sewer leaks/overflows, as well as from some permitted discharges. A standard protocol is needed for addressing typical fecal TMDLs where site-specific models are not available.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Insufficient data are collected on Little River for wet weather analysis. In general, geometric mean fecal coliform concentrations are higher in the summer dry months than corresponding annual or winter wet weather geometric mean concentrations. This is due to a rate of dilution by high, wet weather discharge that exceeds the subsequent increase in fecal coliform loading.

COMMENT

EPA guidance requires that, where nonpoint sources cannot be reduced through enforceable controls, the reduction burden must be placed on permitted sources. The TMDL has applied the standard to the end of the pipe with an expectation that any necessary reductions would come from unregulated, uncontrolled, or unknown nonpoint sources. In the TMDL, the WLA for the point sources should be established at a lower level than the in-stream standard before there can be any contention that EPA has incorporated any MOS. This is especially true because the TMDL only addresses the low flow situation where there would be zero MOS.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Insufficient data are available for wet weather analysis. The TMDL has been modified to include background concentration of fecal coliform which provides additional margin of safety. The background concentration of fecal coliform in Little River is assumed to be 20 counts/100ml.

COMMENT

The TMDL addresses only the single criterion of 200/100 ml geometric mean. There are other criterion in the regulations. If EPA contends that its reference to the single criterion is sufficient to address all other regulatory standards, this needs to be stated, explained, and supported.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The TMDL based on the single criterion of 200 counts/100ml reflects critical conditions. Using this approach the TMDL provides reasonable assurance that other water quality standards can be met under various flow conditions.

COMMENT

On page 2, there is a reference to Appendix A, but no appendix was included.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Appendix A contains water quality data collected on Little River at U.S. Highway 78 near Washington, GA. This appendix is included in the final TMDL.

COMMENT

Why does page 2's mention of suspected sources of fecal not include leaks or overflows from sewers?

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The suspected sources of fecal coliform contamination listed in the TMDL are just some of the possible sources. The TMDL has been revised to include other potential sources such as leaky collection systems, sewer overflows, and wildlife.

COMMENT

The 7Q10 of 17.38 cfs from BASINS looks high.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Comment noted.

COMMENT

On page 4, the margin of safety states that this is the low flow for the previous 20 years. Is this meant to be the same as 7Q10 or 1Q20 ?

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The 7Q10 reported in the TMDL is based on 20 years of flow data.

COMMENT

The TMDL calculation gives all loads to the WLA and zero to LA, which is unlikely in nature where there will be some background in addition to runoff.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The TMDL has been modified to include a background concentration of fecal coliform bacteria. The background concentration of 20 counts/100ml is represented in the LA portion of the TMDL.

COMMENT

In Table 1, the TMDL is given in counts/day, but the WLA and LA are in kg/day. This is either a typo or needs to be explained.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The WLA and LA components of the TMDL should be expressed in counts/day. Table 1 has been modified accordingly.

COMMENT

The TMDL would appear to be a monthly mean load and not a daily maximum. This needs clarification and probably an equivalent maximum to be a TMDL.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The TMDL reported is the total maximum daily load the stream can assimilate.

COMMENT

On page 4, it is stated that there are no seasonal variations that impact... due to biological activities. It is unclear what is meant by this statement since the TMDL requirements make no such distinction. This also points out that seasonal variations are not being addressed.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Seasonal variations are accounted for in the TMDL in the use of the 7Q10 flow. The above referenced statement has been removed from the TMDL report. This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Because of the use of critical low flow conditions; EPA feels this provides an adequate approach for considering seasonal variations.